

## METHYL METHACRYLATE

Methyl methacrylate is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 80-62-6



Molecular Formula:  $\text{C}_5\text{H}_8\text{O}_2$

Methyl methacrylate is a flammable, colorless liquid. It polymerizes easily, forming a clear plastic variously known as Lucite, Plexiglas, or Perspex. It is soluble in methyl ethyl ketone, tetrahydrofuran, esters, and aromatic and chlorinated hydrocarbons. It is slightly soluble in water and has an acrid fruity odor (HSDB, 1991).

### Physical Properties of Methyl Methacrylate

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Synonyms: methyl 2-methyl-2-propenoate; 2-methylpropenoic acid; Diakon

Molecular Weight:	100.13
Boiling Point:	100-101 °C
Melting Point:	-48 °C
Vapor Pressure:	38.4 mm Hg at 25 °C
Vapor Density:	3.6 (air = 1)
Density/Specific Gravity:	0.9440 at 20/4 °C (water = 1)
Log/Octanol Water Partition Coefficient:	1.38
Henry's Law Constant:	$3.24 \times 10^{-4}$ atm-m <sup>3</sup> /mol
Conversion Factor:	1 ppm = 4.09 mg/m <sup>3</sup>

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(Howard, 1990; HSDB, 1991; Sax, 1989; U.S. EPA, 1994a)

## SOURCES AND EMISSIONS

### A. Sources

Methyl methacrylate is used as a monomer for polymethacrylate resins and for impregnation of concrete (HSDB, 1991).

The primary stationary sources that have reported emissions of methyl methacrylate in California are manufacturers of aircraft and parts, manufacturers of miscellaneous plastic products, and manufacturers of synthetic products (ARB, 1997b).

Methyl methacrylate was registered for use as a pesticide; however as of December 31, 1991,

it is no longer registered for pesticidal use in California (DPR, 1996).

#### **B. Emissions**

The total emissions of methyl methacrylate from stationary sources in California are estimated to be at least 54,000 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

#### **C. Natural Occurrence**

No information about the natural occurrence of methyl methacrylate was found in the readily-available literature.

### **AMBIENT CONCENTRATIONS**

No Air Resources Board data exist for ambient measurements of methyl methacrylate.

### **INDOOR SOURCES AND CONCENTRATIONS**

No information about the indoor sources and concentrations of methyl methacrylate was found in the readily-available literature.

### **ATMOSPHERIC PERSISTENCE**

Methyl methacrylate exists in the atmosphere in the gas phase. The dominant atmospheric loss process for methyl methacrylate is expected to be by the reaction with the hydroxyl radical. Based on this reaction, the atmospheric half-life and lifetime of methyl methacrylate is estimated to be 9 hours and 13 hours, respectively (Saunders et al., 1994). Its reaction products include pyruvic acid, methyl pyruvate, epoxides, and formaldehyde (Kao, 1994).

### **AB 2588 RISK ASSESSMENT INFORMATION**

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics “Hot Spots” Program (AB 2588). Of the risk assessments reviewed as of December 1996, for non-cancer effects, methyl methacrylate did not contribute to a total hazard index in any of the risk assessments reporting a total chronic or acute hazard index greater than 1 (OEHHA, 1996b).

### **HEALTH EFFECTS**

Probable routes of human exposure to methyl methacrylate are inhalation, ingestion, and dermal contact.

**Non-Cancer:** Acute exposure is irritating to the eyes, nose, and throat of humans. Chronic inhalation exposure in humans has produced symptoms including headaches, paresthesia, fatigue, sleep disturbances, and irritability. Kidney and liver lesions have been observed in humans chronically exposed to methyl methacrylate by ingestion. In one study, occupational exposure to high doses of methyl methacrylate has been associated with cardiovascular disorders in humans (U.S. EPA, 1994a).

A chronic non-cancer Reference Exposure Level (REL) of 980 micrograms per cubic meter is listed for methyl methacrylate in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program, Revised 1992 Risk Assessment Guidelines. The toxicological endpoint considered for chronic toxicity is the respiratory system (CAPCOA, 1993). The United States Environmental Protection Agency (U.S. EPA) has not established a Reference Concentration (RfC) for methyl methacrylate. The U.S. EPA is currently reviewing the oral Reference Dose (RfD), but has set a provisional RfD of 0.08 milligrams per kilogram per day. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects (U.S. EPA, 1994a).

Pregnancy complications in exposed female workers as well as sexual disorders in both sexes chronically exposed to methyl methacrylate have been reported. There is limited evidence of fetal abnormalities in offspring of rats exposed to methyl methacrylate (U.S. EPA, 1994a).

**Cancer:** A retrospective epidemiology study could not establish a causal relationship between occupational exposure and increased incidences of colon and rectal cancers. The U.S. EPA has not classified methyl methacrylate as to its carcinogenicity. The International Agency for Research on Cancer has classified methyl methacrylate as Group 3: Not classifiable based on no adequate data in humans and insufficient evidence in animals (IARC, 1987a).

